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NOTES ON THE ASPIDISTRAE-COMPLEX OF
PINNASPIS, WITH DESCRIPTION OF
A NEW SPECIES
(HOMOPTERA : COCCOIDEA)

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Apparently or presumably consequent on the agency of man, many species of scale insects have widely spread over the world and a great part of them remain uncertain in regard to their cradles. We have several such species belonging to the genus *Pinnaspis*, namely, *P. aspidistrae*, *P. buxi* and *P. strachani*. In their revision on the genus Ferris & Rao (1947) stated that the centre of the genus was in India and Ceylon. Some species of the genus, however, have been found from Japan, China and the Philippines since that time, and the genus seems also rich on the eastern side of Asia including the named localities. In this area are now known three species of scale insects close to *P. aspidistrae* and *P. strachani*, all of which form a species group, the *aspidistrae*-complex. I believe that the discovery of this species group in Far East may offer some suggestion about the origins of the widely distributed two species *P. aspidistrae* and *P. strachani*. Before going further, will be described a new species belonging to the *aspidistrae*-complex.

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***Pinnaspis piperis*, sp. nov.**

Adult female fusiform, rather strongly lobed laterally in free segments, attaining 1.3 mm. in length and 0.6 mm. in width. Derm membraneous except for pygidium. Antennae with a seta. Anterior spiracles with a compact cluster of disc pores; posterior spiracles with a much smaller cluster of three to nine disc pores. A submarginal dorsal boss present on first and third abdominal segments each and also in prothoracic region, not sclerotized in the material at hand but well marked out. Preanal scars normally present and well developed. Perivulvar pores numerous in five groups. Median lobes moderate in size, closely appressed together medially, forming a half circle, with three or four lateral incisions; median zygois protruding much anteriorly. Second lobes bilobed, the inner lobule with basal paraphyses, the outer also well developed, shorter than the inner. Third lobes

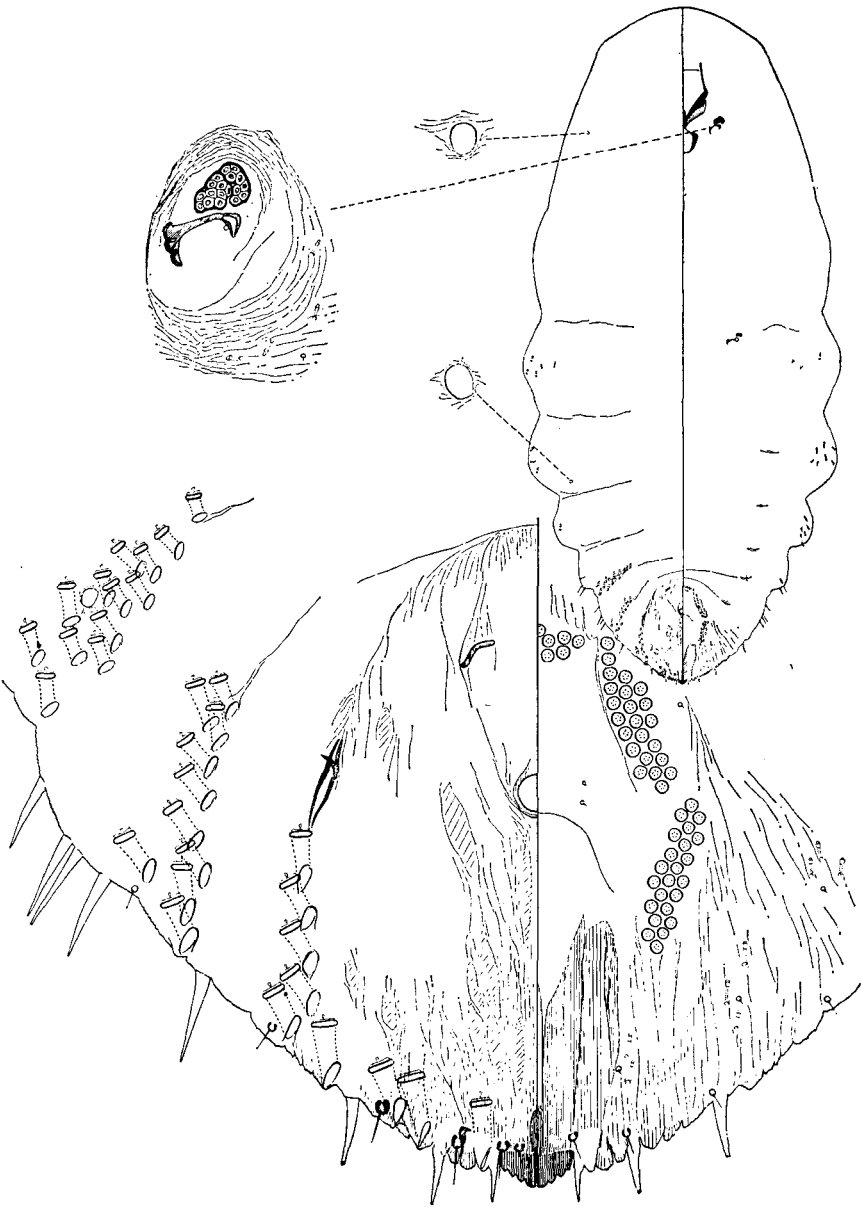


Fig. 1. *Pinnaspis piperis*, sp. nov. : adult female.

indicated by a low serrate process. Marginal macroducts of pygidium seven in number on each side. Submarginal dorsal macroducts rather numerous, five to twelve, including one at margin, on third abdominal segment, four to eleven on the fourth, and two to six on the fifth. Somewhat smaller submarginal macroducts scattered as follows: one or two on mesothorax, four to ten on metathorax, six to nine on first abdominal segment, four to eight on the second, and two on the third. Submedian dorsal ducts of any size absent. One or two short submarginal gland spines present on metathorax and first abdominal segment each, and one to four on the second; two to four elongate marginal gland spines on the third and fourth each, and four single ones caudad of the fourth. Scale of female rather broad, brown in colour; that of male white, felted and tricarinate.

Ryukyu Islands, on *Piper Kadsura*: Naze, Amami-Ōshima (21. V, 1957, S. Takagi) and Tamagusuku-mura, Okinawa (26. VIII, 1962, T. Isobe). Type slides in the collection of the Entomological Institute, Hokkaido University, Sapporo.

This species is extremely close to *P. aspidistrae*, but I am much inclined to the opinion that it may be a good species distinguishable from *P. aspidistrae* by the preanal scars normally well developed and the submarginal dorsal macroducts more numerous. It may be also distinguished from *P. boehmeriae* by the well-developed preanal scars and by lacking submedian dorsal microducts.

Aspidistrae-complex

To this species group belong the early described species *P. aspidistrae* (Signoret, 1869) and *P. strachani* (Cooley, 1899) and the recently described ones *P. boehmeriae* Takahashi (1957), *P. musae* Takagi (1963) and *P. piperis* Takagi (sp. nov.).

P. aspidistrae is a well-known pest of a long list of plants over the world. In Japan it occurs also commonly afield on various ferns, Liliaceous grasses, etc. *P. strachani* is also distributed widely, but mainly in the tropics and subtropics, feeding on many Dicotyledoneae, palms, orchids, etc. It should be mentioned here, however, that in Japan it seems rarely to be found in orange orchards. The other three species of the *aspidistrae*-complex come all from Far East. *P. boehmeriae* lives in Japan, feeding on plants belonging to *Boehmeria*, *Cirsium*, *Liriope* and *Synurus*. *P. musae* and *P. piperis* are known only from the original descriptions, the former being found on bananas from the Philippines and the latter on *Piper Kadsura* from Ryukyu.

The five species are commonly characterized as follows:—The body form is rather slender, but not much elongated, with the free segments well lobed laterally. Median lobes moderate, not very much enlarged nor reduced in size, appressed together closely along their entire mesal length, forming more or less of a half circle, with lateral notches; median zygosis produced much anteriorly. Second lobes well developed and bilobulate, the inner lobule not markedly expanded apically. Dorsal macroducts present at least in the submarginal series on the third to fifth abdominal segments, not extremely reduced in number. Free segments scattered with smaller submarginal macroducts. Perivulvar pores numerous.

The five species offer a remarkable variation only in the pattern of dorsal ducts. In

fact, through the members of the genus *Pinnaspis* is in evidence the tendency towards the reduction of the dorsal ducts. Among the *aspidistrae*-complex *P. musae* may represent the basic pattern of dorsal ducts, having macroducts in both submedian and submarginal series. The other four show successive stages towards the reduction of the submedian series. In *P. strachani* the submedian series are composed of normal macroducts mingled or not with microducts in the case of the form "*townsendi* type" (after Ferris & Rao, 1947) or entirely replaced by microducts; in *P. boehmeriae* replaced by microducts; in *P. aspidistrae* represented by microducts or wanting; and in *P. piperis* entirely wanting so far as shown by the type material.

The macroducts of the submarginal series are variable in number for each species, and yet it seems that the recently described three species are characterized by having more numerous submarginal macroducts than *P. aspidistrae* and *P. strachani* as shown below.

	Abd. III	Abd. IV	Abd. V
<i>P. aspidistrae</i> ¹⁾	2- 8	2- 6	1-2
<i>P. strachani</i> ²⁾	4- 6	2- 3	0-2
<i>P. boehmeriae</i>	8-14	5-11	3-5
<i>P. musae</i>	7-10	3- 7	2-4
<i>P. piperis</i>	5-12	4-11	2-6

1) Ferris & Rao (1947) give the following numbers: 4-5 for Abd. III, 3-4 for IV, and 2 (or at times 3-4) for V; and Balachowsky (1954) gives: 4-7 for III, 3-5 for IV, and 1-2 for V.

2) Ferris & Rao (1947) give the following numbers: 3-5 for Abd. III, 3-5 for IV, and 1-3 for V; and Balachowsky (1954) gives: 4-8 for III, 4-6 for IV, and 2-6 for V.

Certain other characters may be also employed in distinguishing species in the *aspidistrae*-complex, but they offer minor or rather variable specific differences. One of such characters is the presence or absence of the preanal scars. In *P. strachani*, *P. musae* and *P. piperis* the preanal scars are at least normally present and well developed, but may at times be entirely obsolete. In *P. aspidistrae* and *P. boehmeriae* the preanal scars are often absent and merely a pair of small chitinized patches are seen where the scars should be expected, but it is not rare to meet with individuals in which the preanal scars are seen, although these scars are but faintly indicated or represented by quite fine crescents.

In brief, the *aspidistrae*-complex is a close group, composed of five species which may at times be not easily distinguished, and it is probably native to the eastern side of Asia. In this connection it should be kept in mind that some described forms of *Pinnaspis* are at present not definitely recognizable and that several of them may be close to *P. aspidistrae* or *P. strachani* (after Ferris & Rao, 1947). In the present study such forms are entirely neglected, but careful examinations of their type specimens as well as abundant further material are of course necessary in order to take a general view of the *aspidistrae*-complex.

Key to species

1. Scale of female white; posterior spiracles lacking disc pores or provided with one or a few disc pores; submedian dorsal ducts always present, composed of macroducts mingled or not with microducts or entirely replaced by microducts; preanal scars normally present and well developed. *P. strachani*.
Scale of female brown; posterior spiracles always provided with disc pores. 2.
2. Second lobes without basal paraphyses on the inner lobule; submedian series of dorsal ducts composed of macroducts; preanal scars normally present and well developed. . . . *P. musae*.
Second lobes with basal paraphyses on the inner lobule; submedian series of dorsal ducts composed of microducts or absent. 3.
3. Fifth abdominal segment normally with one or two submarginal macroducts; submedian dorsal microducts present or absent; preanal scars absent or if present ill developed. . . *P. aspidistae*.
Fifth abdominal segment with submarginal macroducts more numerous than two. 4.
4. Submedian dorsal microducts present; preanal scars absent or if present ill developed.
. *P. boehmeriae*.
Submedian dorsal microducts absent; preanal scars normally present and well developed. . . .
. *P. piperis*.

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BOOK REVIEW

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The second series of the publication consists of four parts, which are manual for the identification of Japanese insects belonging to the following families:—

LEPIDOPTERA: *Cyclidiidae* and *Drepaniidae*. By Hiroshi Inoue. Series 2, Part 1, ii+54 pp., 128 text-figures & 3 plates.

DIPTERA: *Dixidae*. By Mitsuo Takahashi. Series 2, Part 2, ii+22 pp., 19 text-figures & 1 plate.

COLEOPTERA: *Carabidae* [I]. By Takehiko Nakane. Series 2, Part 3, ii+98 pp., 66 text-figures & 6 plates.

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